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REMARKS

Claims 4, 7-8, 11-13, 15, 18 and 21-31 are all the claims presently pending in the application. Claim 4 has been amended to more clearly define the claimed invention. Claims 28-31 have been added.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Applicant gratefully acknowledges the Examiner's indication that claims 7-8, 11-13 and 24-25 are allowed. However, Applicant respectfully submits that all of the claims are in condition for immediate allowance.

Claims 4, 15, 18, 21-23 and 26-27 stand rejected under 35 USC 103(a) as being allegedly unpatentable over Fukumoto et al. (USP 6,583,837) in view of Yamada et al. (USP6,344,883) further in view of Hsieh (USP 6,466,295).

This rejection is traversed in view of the following discussion.

I. THE CLAIMED INVENTION

The claimed invention (e.g., as defined by claim 4) is directed to a liquid crystal display device. The device includes a first substrate on which a plurality of pixel electrodes are formed, a second substrate on which an opposing electrode is formed, a liquid crystal layer sandwiched between the first and second substrates, the second substrate further having thereon a plurality of protrusions, each of the protrusions being positioned at a substantially central portion of a corresponding one of the pixel electrodes and elongated toward the first substrate, and an alignment layer formed between the plurality of protrusions and the first substrate. The plurality of protrusions comprises a rod-shaped spacer extending between the first and second substrates.

Importantly, the plurality of pixel electrodes include a substantially symmetrical shape (Application at page 13, line 20).

Conventional liquid crystal display devices attempt to improve a viewing angle by including a cutout portion of the common electrode and alignment layer (Application at

Figure 1A; page 2, lines 15-16). When a voltage is applied, the electric fields at the edges of the cutout are tilted such that each pixel is divided into two or more liquid crystal domains. However, such conventional devices require additional processing steps and must be precisely positioned. (Application at page 3, lines 11-18).

In the claimed invention, on the other hand, the plurality of pixel electrodes include a substantially symmetrical shape (Application at page 13, line 20). Since the protrusions may be positioned at a substantially central portion of a corresponding one of the pixel electrodes having a generally symmetrical shape, the protrusions may serve as cores for dividing alignment directions of the liquid crystal layer (e.g., in the pixel regions) (Application at page 16, lines 2-23). This may result in a high response speed of the liquid crystal layer for the division and stabilizing boundaries between divided domains in the pixel regions.

II. THE ALLEGED PRIOR ART REFERENCES

The Examiner alleges that Fukumoto would have been combined with Yamada and Hsieh to form the invention of claim 4, 15, 18 and 21-23. Applicant submits, however, that these references would not have been combined and even if combined, the combination would not teach or suggest the features of the claimed invention.

Fukumoto discloses a liquid crystal display (LCD) device which includes protrusions 27 formed on a common electrode 21 of a color filter substrate 200 (Fukumoto at col. 5, lines 8-11).

Yamada discloses an LCD device having convex portions 66 formed on a substrate (Yamada at col. 25, lines 25-35).

Hsieh discloses a method of forming a spacer for an LCD device which includes a protrusion-spacer structure 25 formed on a substrate 20 (Hsieh at col. 5, lines 51-61).

Applicant respectfully submits that these alleged references are unrelated, and no person of ordinary skill in the art would have considered combining these disparate references, absent impermissible hindsight.

In fact, Applicant submits that the alleged references provide no motivation or suggestion to urge the combination as alleged by the Examiner. Indeed, these alleged references clearly do not teach or suggest their combination. Therefore, Applicant respectfully submits that one of ordinary skill in the art would not have been so motivated to

combine the alleged references as alleged by the Examiner. Therefore, the Examiner has failed to make a prima facie case of obviousness.

Specifically, as Applicant pointed out in the Amendment dated June 13, 2006, the spacers taught by Yamada et al. and Hsieh serves as spacers for keeping a cell gap between two substrates to form the liquid crystal panel. To the contrary, the protrusions 27 taught by Fukumoto do not serve as spacers for keeping a cell gap between two substrates to form the liquid crystal panel. Instead, the protrusions 27 are simply protruding portions projecting from the protrusion 22 in direction parallel to the surface of the substrate 200. Further, the protrusions taught by Fukumoto are formed to eliminate a disclination line in the pixel regions. Therefore, the structure taught by Fukumoto cannot be combined with the structure taught by Yamada or Hsieh, because **the protrusions 27 taught by Fukumoto cannot be replaced with the spacers taught by Yamada or Hsieh.**

Further, even assuming (arguendo) that the disclosure taught by Yamada el al. would have been forced somehow to be combined with the structure taught by Fukumoto, the spacers taught by Yamada are formed and located on a region other than pixel electrodes 13 taught by Fukumoto et al, based on the technical disclosure of Yamada el al. In addition, the spacers in Yamada are located outside of the protrusions.

Moreover, even assuming (arguendo) that the disclosure taught by Hsieh would have been forced somehow to be combined with the structure taught by Fukumoto , the spacers taught by Hsieh are formed and located on a layer 211 comprising a black matrix and colored layer of RGB (see column 8, lines 9-14) taught by Fukumoto, based on the technical disclosure of Hsieh. The layer 211 comprising the black matrix and the colored layer of RGB is simply depicted as a single layer provided on a color filter substrate 201. Therefore, the locations will be not fixed where the spacer should be located. In addition, the spacers are located outside of the protrusions 27. Therefore, the protrusions do not comprise any spacer extending between two substrates.

Consequently, even if these cited references would have been combined, as alleged by the Examiner, the features of the claimed invention could not have been obtained. Thus, one skilled in the art would not have reached any conception from allegedly combining the cited references to modify Fukumoto to form the claimed invention.

Moreover, neither Fukumoto, nor Yamada, nor Hsieh, nor any alleged combination

thereof teaches or suggests "*a first substrate on which a plurality of pixel electrodes are formed, said plurality of pixel electrodes comprising a substantially symmetrical shape*", as recited in claim 4 (Application at page 13, line 20).

As noted above, with this novel feature, since the protrusions may be positioned at a substantially central portion of a corresponding one of the pixel electrodes having a generally symmetrical shape, the protrusions may serve as cores for dividing alignment directions of the liquid crystal layer (e.g., in the pixel regions) (Application at page 16, lines 2-23). This may result in a high response speed of the liquid crystal layer for the division and stabilizing boundaries between divided domains in the pixel regions.

Clearly, the cited references neither teach nor suggest the subject features of the claimed invention.

Indeed, with respect to Fukumoto, on page 2 of the Office Action, the Examiner refers to Figure 1B and alleges that Fukumoto teaches pixel electrodes 13 with slits and protrusions 27 between a common electrode and an alignment film. However, the pixel electrodes 13 in Fukumoto clearly do not include a substantially symmetrical shape (e.g., substantially symmetrical about a corresponding protrusion).

Instead, Fukumoto states only that the protrusions 27 (which are formed parallel to the substrate) may oppose a central portion of the pixel electrode 13 (Fukumoto at col. 6, lines 62-65). However, nowhere does Fukumoto teach or suggest that the pixel electrode 13 may include a substantially symmetrical shape (e.g., substantially symmetrical about protrusion 27).

Further, Yamada clearly does not make up for the deficiencies in Fukumoto. Indeed, the Examiner attempts to rely on Figures 12A and 29 in Yamada to support his position. However, nowhere in these figures, or anywhere else for that matter, does Yamada teach or suggest a pixel electrode that includes a substantially symmetrical shape (e.g., substantially symmetrical about a protrusion).

Instead, Figure 12A simply discloses a device including a substrate 62, transparent electrode 63, spacer 65 and alignment layer 68 (Yamada at col. 25, lines 25-42), and Figure 29 simply discloses a device including an alignment layer 68 formed directly on the transparent electrode 63 (Yamada at col. 39, line 66-col. 40, line 6). Nowhere do Figures 12A or 29 in Yamada teach or suggest a pixel electrode that includes a substantially

symmetrical shape (e.g., substantially symmetrical about a protrusion).

Indeed, the spacers 65 taught by Yamada are formed on convex portions 66 which is formed on a regions other than pixel regions of a substrate 62 (See column 25, lines 26-34, and FIG. 12B). That is, the convex portions 36 are located so as to surround the pixel regions, as shown in FIG. 1A (see column 13, lines 37-39). Therefore, the spacers 65 taught by Yamada are located on a regions other than pixel regions, and are not positioned at a substantially central portion of a corresponding one of the pixel electrodes as in an exemplary aspect of the claimed invention. Therefore, Yamada does not make up for the deficiencies in Fukumoto.

As to the Hsieh reference, the Examiner again alleges that Hsieh discloses a method of forming a spacer for liquid crystal display devices where in FIG. 2C, element 25 is a spacer/protrusion and in FIG. 3D element 35 is a spacer/protrusion.

However, Hsieh does not teach or suggest a pixel electrode that includes a substantially symmetrical shape (e.g., substantially symmetrical about a protrusion). Therefore, Hsieh clearly does not make up for the deficiencies in Fukumoto and Yamada.

Therefore, Applicant submits that these references would not have been combined and even if combined, the combination would not teach or suggest the features of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 4, 7-8, 11-13, 15, 18 and 21-27, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: 11/28/06

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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that the foregoing Amendment and RCE were filed by facsimile with the United States Patent and Trademark Office, Examiner Fazli Erdem, Group Art Unit # 2826 at fax number 571-273-8300 this 28th day of Nov., 2006.

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